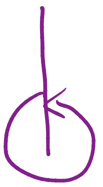
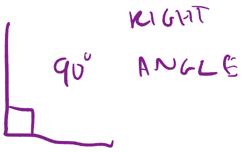
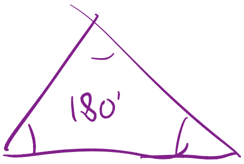
Shapes and Space (1) Angles on Parallel Lines

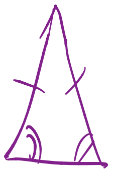
Do now: Create a spider diagram with as many angles facts as you can remember (5minutes)



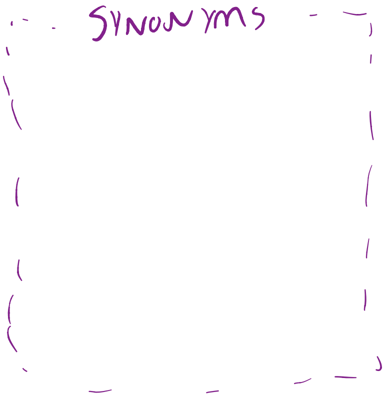
FULL TURN IS 360°

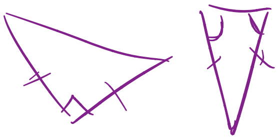


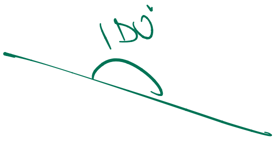




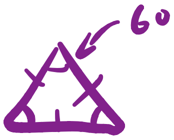
BASE ANGLES IN AN ISOSCELES ARE EQUAL

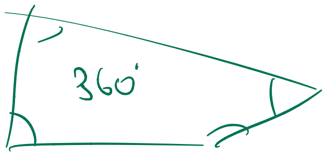


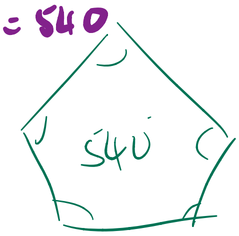




$180(5-2)$
$= 540$



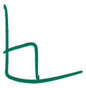




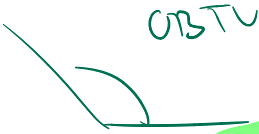
TOTAL OF INTERIOR ANGLES

$180(n-2)$

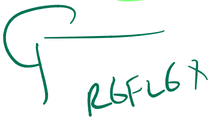
$x < 90$



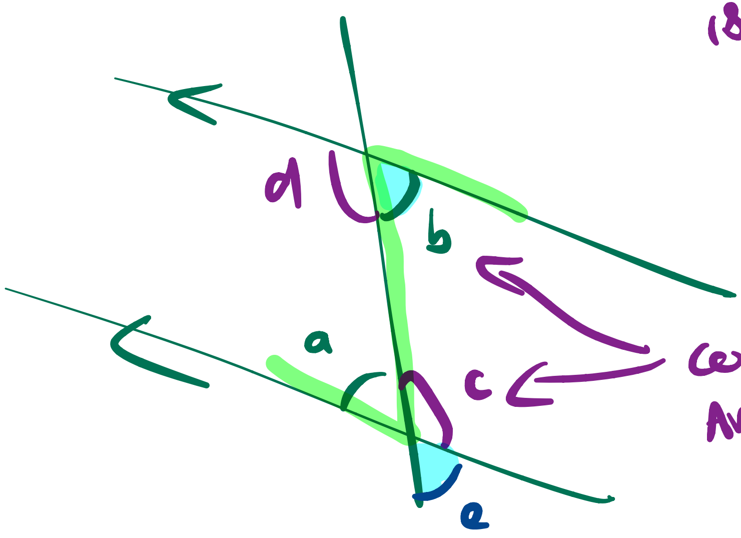
$x = 90$



$90 < x < 180$



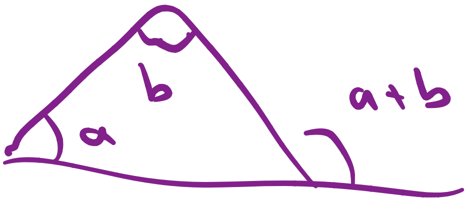
$180 < x < 360$

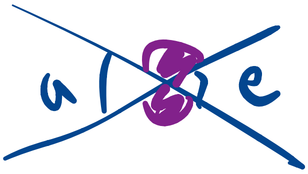


CO-INTERIOR ANGLES SUM TO 180°

a = b ALTERNATE ANGLES ARE EQUAL
c = d

e = b CORRESPONDING ANGLES ARE EQUAL





VERTICALLY OPPOSITE

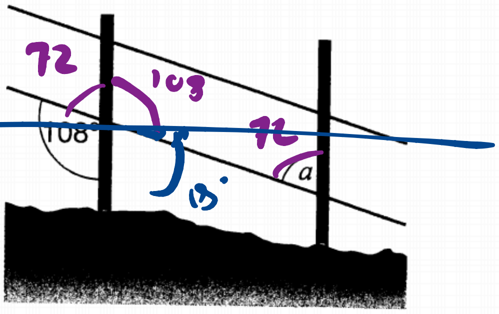
Angles and Parallel Lines

Exercise 1

① This fence is going down a hill.
The posts are vertical.
The wires are parallel.

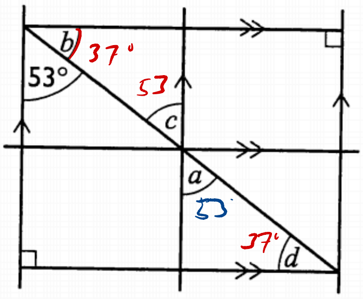
a What is angle *a*?

b What angle do the wires make with the horizontal?



1. a. 72°
b. 18°

② The diagram shows part of a fence panel.
Find the angles *a*, *b*, *c* and *d*.



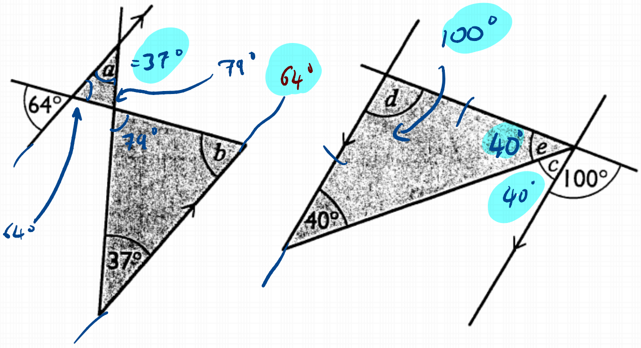
a =

b =

c =

b =

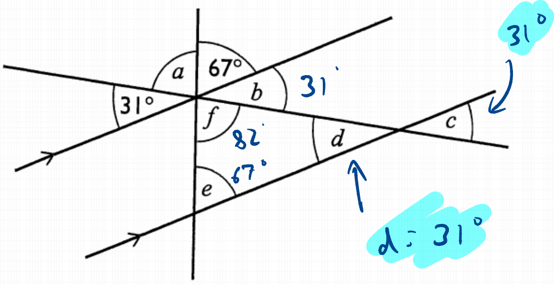
③ Write down the sizes of the lettered angles in these diagrams.
For each one give your reason.



a = 37°

b = 64°

④



d: 31°

a = 82

b = 31°

f = 180 − (31+67)

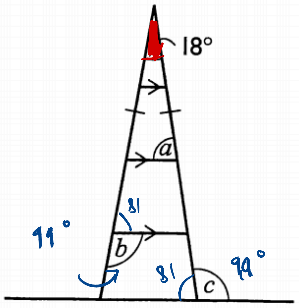
= 82°

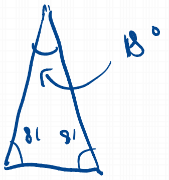
e = 67°

a Write down the size of each lettered angle.
For each one give your reason.

b What is *f* + *d* + *e*? = 180°

⑤ This diagram represents an electricity pylon.
Find the sizes of the angles marked a, b and c. Give your reasons.



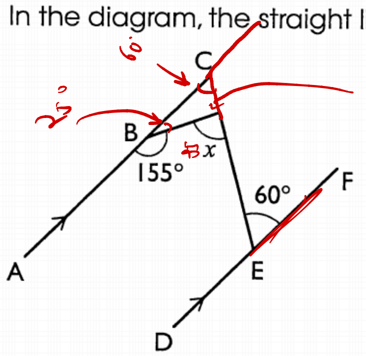


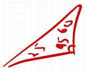
180 - 18 = 162°

a = 81°

b = c = 99°

⑥ In the diagram, the straight lines ABC and DEF are parallel.

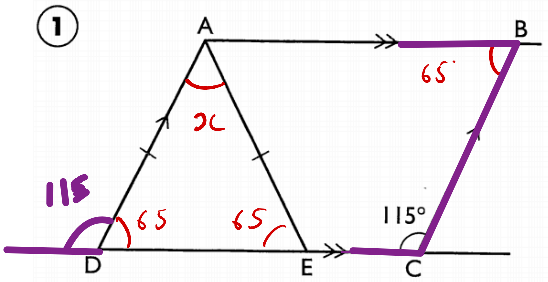




Find the size of angle x. Give your reasons.

Exercise 2

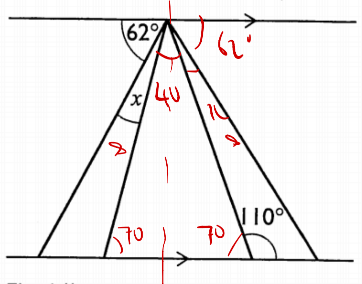
①



x = 50°

AB is parallel to DC. AD is parallel to BC.
E is a point on DC such that ADE is an isosceles triangle.
Find the size of angle DAE. Give your reasons.

② This diagram has a single line of symmetry and a pair of parallel lines.

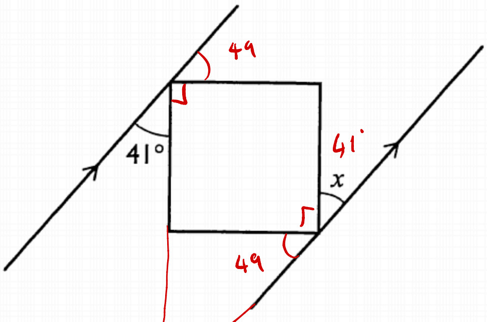


180 − (62 + 62 + 40) = 16

x = 8°

Find the size of angle x. Give your reasons.

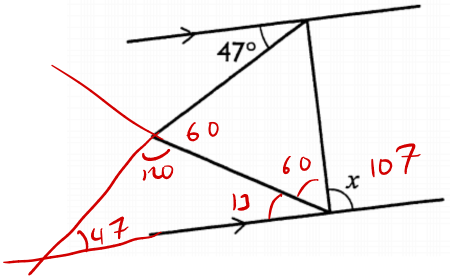
③ The diagram shows a square and a pair of parallel lines through two of its vertices.



$x = 41°$

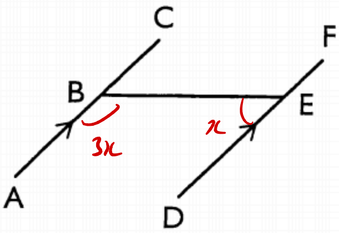
Jim thinks that $x = 41°$.
Is Jim correct?
Give a reason for your answer.

④ The diagram shows an equilateral triangle and a pair of parallel lines, through two of its vertices.
Find the value of x. Give your reasons.



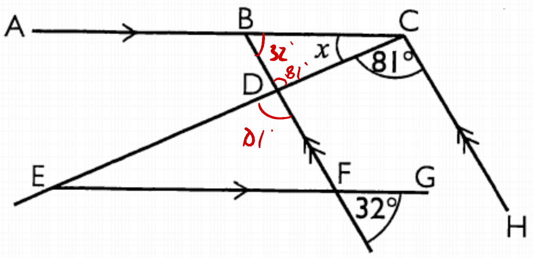
$x = 107°$

⑤ ABC and DEF are parallel lines.
Angle ABE is three times angle BED.
Work out the size of angle ABE.



$4x = 180$
$x = 45$
ABE = 135°

⑥



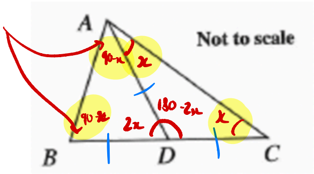
ABC, EDC, BDF and EFG are straight lines.
AC is parallel to EG.
BF is parallel to CH.
Find the value of x.

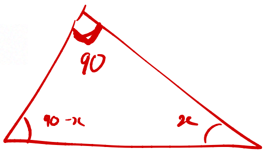
$x = 81 + 32 = 113°$

Extension

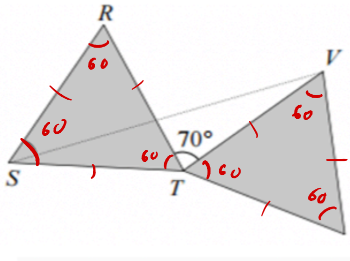
[IMC 2000 Q8] In the triangle ABC, $AD = BD = CD$. What is the size of angle BAC?

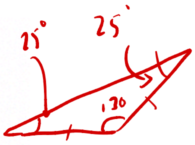
$\frac{180-2x}{2} = 90-x$





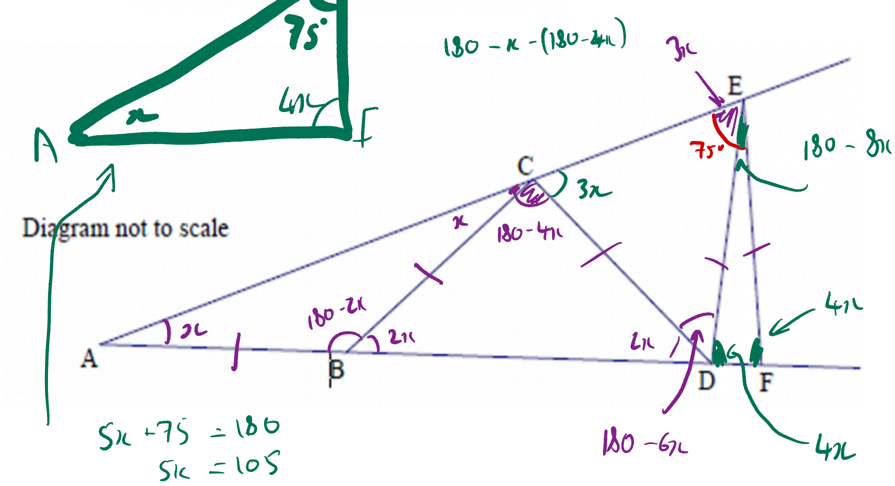
[~~Kangaroo Pink 2013 Q9~~] The diagram shows an equilateral triangle RST and also the triangle TUV obtained by rotating triangle RST about the point T. Angle $RTV = 70°$. What is angle RSV?





[TMC Regional 2008 Q9] If $AB = BC = CD = DE = EF$ and angle $AEF = 75°$, what is the size of angle EAF?

Solution:



$5x + 75 = 180$

$5x = 105$

$x = 21°$